JETIR.ORG ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

A REVIEW ON FOOD DISCERNMENT AND CALORIES ESTIMATION USING SEGMENTATION

[1]Miss Shreya Anil Kubade Student of Post Graduation
[2]Mr. Suraj Shivaji Redekar Assistant Professor
Department Of Computer Science and Engineering
Ashokrao Mane Group of Institutions, Wathar Tarf Vadgaon, Kolhapur, Maharashtra, India.
Affiliated to DBATU University, Lonere, Maharashtra, India

Abstract

Food detection and calorie estimation using segmentation has received a lot of attention for its ability to promote health and help people manage their health. This article explores the use of segmentation techniques, such as sample segmentation, to accurately identify and quantify food in images or videos. By combining deep learning models learned from large amounts of food information, the system can predict the calorie content of mixed foods. The technology promises to be useful in measuring calories and ingredients, as well as enabling people to make health-conscious food choices. This article discusses progress, challenges and future directions in this field.

Keywords : Computer vision, ML, DL, object detection, Instance segmentation, Optimizer and loss function

I. Introduction

Concerns about health and food consumption increase the need for effective and accurate methods to control and estimate the calorie content of food. Foraging and calorie estimation using segmentation has emerged as a promising approach to meet these needs. Using computer vision and ML techniques, segmentation-based methodologies can identify and identify food in photos or videos. Segmentation plays an important role in separating individual foods from complex backgrounds. It involves dividing the image into different zones so that each food item can be clearly identified. Using advanced segmentation algorithms such as semantic or sample segmentation, this system can identify and identify multiple foods at the same time. The segmentation with DL models trained on extensive food data to predict calorie content. By associating each food segment with corresponding nutritional information (such as calorie density), the system can provide a reliable estimate of the calories contained in a serving.

This technology has great potential in many areas such as food tracking, nutrition tracking and personalized meal planning. It allows individuals to make decisions about their diet, facilitates adherence to specific dietary goals, and assists physicians in providing personalized nutritional recommendations.

In this article, we'll look at the lessons, challenges, and applications of food research and calorie estimation using segmentation techniques. We explore best methods, discuss their limitations, and suggest ways for future research

to improve the accuracy and validity of these methods.

II. Literature Survey

i. FOOD DETECTION WITH IMAGE PROCESSING USING CONVOLUTIONAL NEURAL NETWORK (CNN) METHOD

A Convolutional Neural Network (CNN) method is used to detect food in restaurants using image processing. Using the CNN method, the identification accuracy of 6 foods is 100%, training data is 80%, test data is 20%, time is 9000, and learning rate is 0.0002. Detection time less than 10 seconds, detection accuracy 100%, data distribution 80% training data, 20% test data, time 9000 and operation 0.0002.

Queues at Telkom University Engineering Canteen resulted from service demand above the facility's capacity. Convolutional neural network (CNN) classification is used for image classification, image segmentation and object recognition with high accuracy and performance.

Aguilar et al. used UNIMIB2016 general data to describe foraging with 90% accuracy.

ii. A Deep Convolutional Neural Network for Food Detection and Recognition

This article presents a new deep convolutional neural network (CNN) configuration for sensing and recognizing local food images.The latest information about the most local foods in Malaysia is collected from Internet resources. Compared with traditional feature extraction methods, CNN achieves higher accuracy.Recently, nutrition reporting methods have been developed using pattern recognition and image processing techniques to identify and describe foods. The authors adopted the AlexNet model and built a deep convolutional neural network (CNN) using images from the Food-101 dataset with an accuracy of 1 in 56.4%. The authors used CNNs for food recognition and identification and achieved an accuracy of 73.7%. The authors proposed CNN as the only feature extractor applied to the UEC-FOOD-100 dataset and achieved 72.3% accuracy.

iii. Food Recognition And Calorie Estimation Using Image Processing

This article discusses food information and calorie estimation using image processing. S. Suma, M. Bharathi, G. Harikumar and B.Deepak is Assistant Professor and UG student at SRM Valliammai Engineering College in Tamil Nadu, India. They use graphs to estimate the calorie content of food. Obesity and excess weight are always associated with a high-calorie diet and lifestyle. To keep track of a person's calorie intake, food information and calorie estimation are for estimating the calories of the food put in. The proposed method is trained on 101 food groups and uses CNN (Convolutional Neural Network) as a group to describe the food and decides the calories in the food based on the weight of the food in grams.

This process is beneficial for health and immunity.

iv. Study for Food Recognition System Using Deep Learning

This article discusses the development of a modern computerized food analysis system for nutritional assessment that can be used on mobile devices and cloud services. It aims to solve the problem of food detection and recognition in different food images, because there are many types of food, there are slight differences between and within groups, and apart from that, there is information that is not in a single picture. The authors suggest that deep learning can be used to solve this problem. Examines various food analysis methods using different methods and compares the results.

Our findings show that deep learning as a valid tool for food hygiene and analysis overcomes other techniques such as manual feature extractors, standard machine learning algorithms and DL. Data analysis is important to this process because large volumes of data contain lots of repetitive and irrelevant material.

v. Food Detection and Recognition Using Convolutional Neural Network

This article uses a convolutional neural network (CNN) for the task of detecting and visualizing food images. CNNs show greater accuracy than

SVM-based methods with artefacts, and convolution kernels show that colour dominates the feature extraction process. Photocopies or hard copies of all or part of this work are permitted free of charge, provided the copies receive this notice and are numbered on the first page. Copyright in other parts of this work must be respected. Food image knowledge can solve the food quality problem, but process knowledge is unsatisfactory.

Zhu et al. [12] describe food analysis using microdata as part of technology-based food analysis.

vi. Food Image Recognition and Food Safety Detection Method Based on Deep Learning

In recent years, deep learning has been used for food recognition, but the accuracy and speed of recognition is a concern. This article presents a two-level learning model for YOLO-SIMM and develops two models YOLO-SiamV1 and YOLO-SiamV2. It also proposes a method for the detection and identification of foreign substances in food. Experimental results show that this method can distinguish between desiccant and foreign matter and achieve the desired results. Image recognition and classification, food health management, etc. mobile applications. bring convenience to people's healthy lives. Image analysis and classification technology can be used in many workplaces and industries, and there is still room for improvement in the fundamental problems of image recognition and classification.

vii. Janaki Prasad Koirala's Master's Thesis, Food Object Recognition:

In-depth study applications demonstrated in the Communication, Communication and Research Master of Science at Aalto University. It explores the use of the CNN-based Faster RCNN framework to recognize European food from digital images. Various methods are used to improve the performance of the model, such as using only small tags and measuring the number of training samples for each tag. Finally, the Android app uses this pattern to identify food from photos with an average accuracy of 0.37.

Janaki Prasad Koirala thanks Victor Nassi and the COMNET IT team for their support, his friends Shishir, Manik and Prajwal for their suggestions and advice, and his family for always being there. Also, AI, ANN, CIFARC, CNN, CPUCentral Processing Unit, GPU Graphics Processing Unit, HLHidden Layer, ILInut Layer, LASSOLeast Absolute Shrinkage and Selection Operator, NNNeural Network, OLOoutput, PCAPPrincipal Layer Analysis, RCNredproutionals Network ReLURedproutionals Network ReLUREDSGDAR's talked about. Gradient Descent, SIFTScale Invariant Feature Transformation, SVMSupport Vector Machines.

viii. Computer Vision based Food Recognition with Nutrition Analysis

Food recognition in computer vision is a process that uses machine learning algorithms to identify and classify different foods in images or videos. It has many applications such as nutrition monitoring and tracking, food labeling and food safety. An important benefit of food recognition is that nutritional information can be extracted from food images. There are many food analysis methods such as machine learning algorithms, pattern recognition methods and deep learning methods. Food recognition in computer vision is a rapidly evolving process that uses machine learning algorithms to identify and classify different foods in images or videos.

To build a food recognition system using CNN, data on images of different types of food must be collected and trained to classify them into different categories.

III. Proposed Work

Food images are difficult to recognize due to the variety of colours and textures. Research has focused on different molds that thrive on different foods. Therefore, we take the example of segmentation to find patterns in food. Therefore, we collect images ourselves and from the internet to create the dataset. Model was trained on 10,000 images to recognize food and augment it as additional support. The description of the image helps to understand the model in terms of polygon-based food images used for training data. After that, the model is used to measure and predict the material. We are conducting studies using individual samples to determine the type of molds detected. The main purpose of is to describe the food, and the product displays the meal with a box containing the percentage of calories in the meal and the ingredients in the meal.

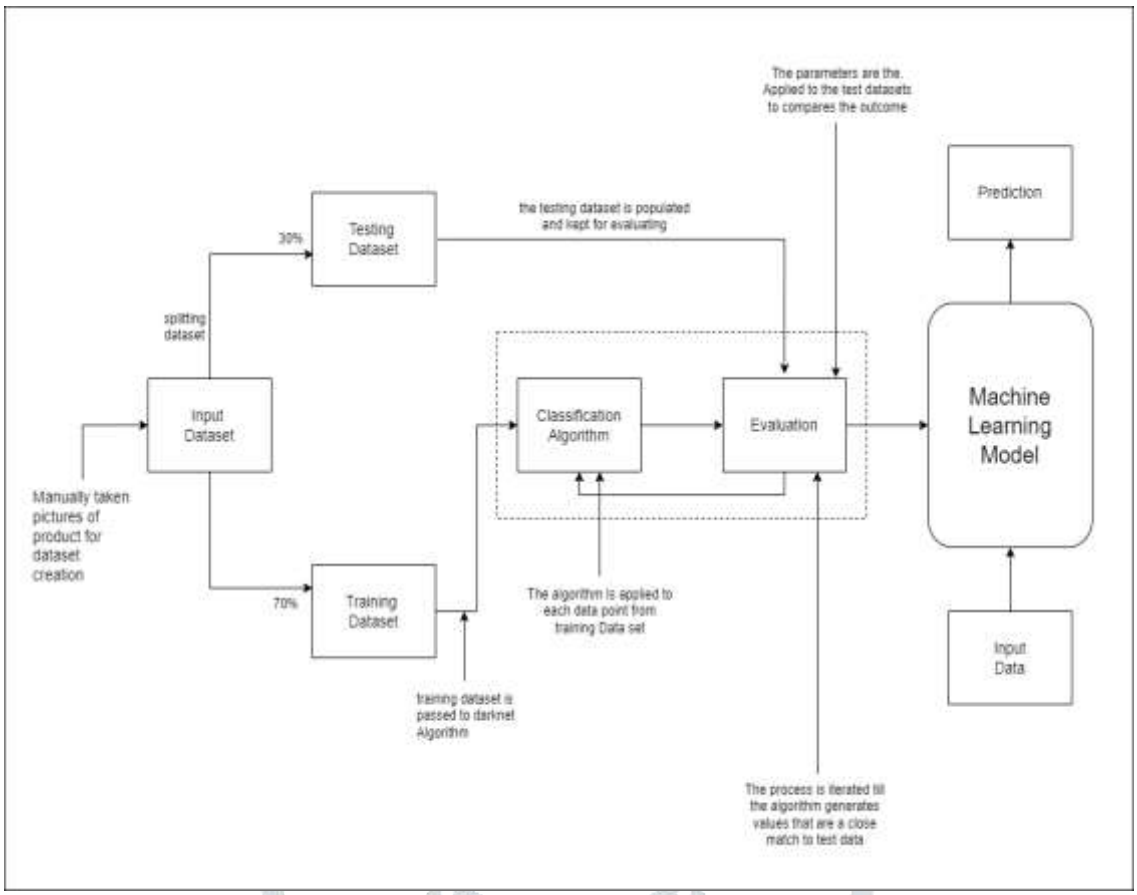

Fig - System Architecture For Food Detection And calories Estimation

IV. Terminologies

A. Computer Vision-

Computer vision tasks include finding, processing, analysing and understanding digital images and extracting high level information from the real world to create telegraphic information or symbols.

B. Optimizer and loss function-

The purpose of the model is to minimize the unemployment rate to find the most unfavourable for the correct forecast.

C. Object Detection

Object detection is a computer vision technique used to replace human intelligence in images and
videos.

D. Instance segmentation

Instance Segmentation is a form of image segmentation that combines object detection and semantic segmentation.
Instance segmentation creates a segmentation map for each category
and class instance for further analysis.

E. Mask R-CNN

Mask R-CNN is a popular deep learning instance segmentation technique that can accommodate multiple classes and overlapping objects.

F. Anchor boxes

An anchor is a bounding box with a predefined height and width, selected based on the size of the product in the document. They are tiled on the image and the mesh estimates the probability and optimization of the junction boxes for each tile. The final map represents the objects discovered for each class. It provides real-time viewing of objects, eliminating the need to scan images with floating windows.

V. Conclusion

Food search and calorie estimation using segmentation techniques has proven to have the potential to change the way we determine and monitor nutrition. Segmentation-based methods that combine computer vision and machine learning algorithms can accurately identify, localize and quantify food in images or videos.

Using advanced segmentation algorithms such as instance segmentation, this process overcomes complex background and congestion problems to clearly depict a person's food. Additionally, when combined with deep learning models trained with extensive food data, the calorie content associated with each food category can be estimated. The practice of foraging and calorie estimation using segmentation has had a huge impact in many ways. Additionally, it provides important information for nutritional care, helping physicians make recommendations for individual nutrition and interventions. Future research should focus on solving these problems to improve the accuracy and utility of segmentation-based food detection and calorie estimation methods.

Overall, advances in segment-based technology have great potential to improve nutritional assessment, encourage healthy behaviours, and promote health.

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